Commonwealth of Massachusetts
Office of Consumer Affairs & Business Regulation
Division of Energy Resources

RENEWABLE ENERGY PORTFOLIO STANDARD

ADVISORY RULING for Public Service of New Hampshire's Proposed Biomass Conversion of Its Schiller Station Unit 5 in Portsmouth, NH

October 27, 2003

1. Advisory Ruling – Request of Public Service of New Hampshire

Public Service of New Hampshire (PSNH) has requested that the Massachusetts Division of Energy Resources (DOER or the "Division") provide an Advisory Ruling with regard to the qualification for the Massachusetts Renewable Energy Portfolio Standard (RPS) of a proposed conversion of Schiller Station Unit 5 in Portsmouth, New Hampshire.[1] This document is DOER's response.

The RPS regulations, at 225 CMR 14.06(5),[2] provide an opportunity for a generation unit owner or developer "to request an advisory ruling from the Division to determine whether a Generation Unit would qualify as a New Renewable Generation Unit." The primary purpose of the Advisory Ruling provision is to afford the owner or developer of an existing or new generation unit a means of assessing the likelihood and conditions under which the unit would qualify as a New Renewable Generation Unit under the RPS regulations prior to committing significant investment in time and/or money for project development. This is especially useful in the case of a biomass unit, for which the RPS regulations include fuel, technology, and air emission criteria that DOER must interpret in its evaluation of each such unit. Note that the actual RPS qualification of a generation unit would be in the form of a Statement of Qualification from DOER. The unit's owner or developer would supply considerably more and certain detail in submitting an application for a Statement of Qualification. In the case of the Schiller unit, DOER would provide an opportunity for public comment on an eventual application, per the RPS regulations at 14.06(2)(b).[3]

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[1] The PSNH request came in the form of a letter to Dwayne Breger at DOER, dated April 4, 2003, and hereafter referenced as the PSNH 4/4/03 letter.

[2] Hereafter, all references to the RPS regulations will be to sections of 225 CMR 14.00.

[3] The application process for a Statement of Qualification is stated in the RPS regulations at Sections 14.06(1) and (2), including provisions for public comment. A Statement of Qualification signifies a finding by DOER that a generation unit is eligible as a New Renewable Generation Unit. In the case of a biomass plant, an application normally is submitted when the developer or owner can provide sufficient technical information on the plant's technology, fuel type(s), and air emissions for a thorough evaluation by DOER in consultation with the

DOER received a letter from PSNH dated April 4, 2003, formally requesting the Advisory Ruling and providing a description and other information about the biomass generation unit being considered. PSNH requested that this Advisory Ruling be shared with the public to solicit comments. Accordingly, DOER distributed a Draft Advisory Ruling to RPS and biomass stakeholders, and offered interested persons an opportunity to comment on the Draft Advisory Ruling. Comments were received from the following:

- Conservation Law Foundation;
- EcoPower, LLC;
- Ridgewood Renewable Power; and
- State of Maine Department of Environmental Protection.

DOER appreciates the four comments received and has taken them into consideration in finalizing this Advisory Ruling. However, since this is not a formal rule making process, DOER does not respond to the comments explicitly.

2. Description of Biomass Project

PSNH owns and operates the 150 MW coal and oil fired Schiller Station in Portsmouth, NH. The facility consists of three stand-alone 50 MW boilers, each with its own associated generation equipment. PSNH is considering replacing one of these boilers, Unit 5, with a fluidized bed (FB) boiler with the capability and intent to burn 100% wood chips and other eligible biomass fuels. The FB boiler would make use of the existing associated equipment to generate electricity with the new boiler, although the unit would remain independent of the other two 50 MW coal and oil units. The FB boiler, with the associated generation equipment, would also be rated at a capacity of 50 MW.

In addition to 100% wood, the FB boiler would have the capability and be qualified by appropriate permits to burn 100% coal (or any combination of wood and coal). PSNH has indicated that this is critical for project financing and for mitigating operational risk in the event that the wood fuel supply becomes "inadequate or uneconomical."[4]

PSNH has received emission specifications and guarantees from an unspecified FB vendor that have been shared with DOER and the Massachusetts Department of Environmental Protection (DEP). PSNH states that these guaranteed emissions would be equal to or below recent Best Available Control Technology (BACT) requirements for both wood and coal. BACT requirements for a particular project must be determined on a case-by-case basis, and they would be determined for this project by the New Hampshire Department of Environmental Services (NH DES).

Massachusetts Department of Environmental Protection (DEP). Although not specified in the RPS regulations, the ideal timing of an application for a biomass plant would be immediately following issuance of a construction permit by the relevant state environmental regulatory agency, at which time all relevant information can be made available.

[4] From page 1 of the PSNH 4/4/03 letter.

3. Discussion of Vintage Generation Unit

As per the definitions in the RPS regulations (Section 14.02), a Vintage Generation Unit is a unit "that meets the requirements of 225 CMR 14.05 (1) (a) and that has a Commercial Operation Date of December 31, 1997, or earlier." Although the Schiller Station unit was in operation before that date, it never met the standards of 14.05(1)(a), since it never operated with an eligible renewable resource or fuel and never met the technical standards. Hence, it is DOER's conclusion that this unit would not be a Vintage Generation Unit under the RPS regulations.

This conclusion is consistent with the objectives of the RPS program to bring new renewable energy generation into operation in New England and to displace conventional generation resources.

4. Discussion of Eligible Biomass Fuels, Co-firing, and the Use of Ineligible Fuels

PSNH intends to reduce the coal use of the Schiller Station as a whole by one-third of its current levels by utilizing biomass in the new FB boiler, which would burn up to 450,000 tons of wood per year. PSNH states that the wood supply for the Schiller Station would come substantially "from New Hampshire and Massachusetts as whole tree chips, clean urban wastes, pallets, and, possibly, clean construction and demolition (C&D) wastes."[5] This list of sources is consistent with the definition of Eligible Biomass Fuel in Section 14.02 of the RPS regulations.[6]

As noted above, PSNH states that the Schiller Station FB generation unit would primarily burn clean wood chips and other RPS-eligible biomass fuels. However, for reasons of fuel supply risk and project financing, PSNH intends to request inclusion from the NH DES that its permits include a provision that would allow it to use coal in periods of time when the wood supply is "inadequate or uneconomical."[7] At such times, Schiller might operate in a co-firing mode with wood and coal simultaneously fed into the boiler, or in non-concurrent mode with 100% coal.

If and when Schiller were to switch from the use of all wood to all coal, PSNH would be required to report to DOER in accordance with the RPS regulations at 14.06(3), since that would affect the unit's eligibility status, at least during the period of time in which it burned only coal. If Schiller were to switch to 100% coal for a significant period of time, DOER could, under the regulations at 14.06(4), suspend or revoke the unit's Statement of Qualification for failure to comply with the RPS regulations and/or the provisions of the unit's Statement of Qualification. Were that to occur, DOER would reinstate the unit's qualification if it accepted PSNH's

[5] From page 1 of the PSNH 4/4/03 letter.

[6] Construction and demolition (C&D) wastes are covered in the RPS definition of Eligible Biomass Fuel at 14.02 as "organic refuse-derived fuel that is collected and managed separately from municipal solid waste." DOER would likely request that records of fuel supplies be maintained by PSNH and reported to DOER, and DOER would always have the right to inspect fuel supplies upon request.

[7] From page 2 of the PSNH 4/4/03 letter.

application for such reinstatement, including satisfactory explanations and a certification that eligible operation had resumed.

RPS regulations at 14.05(3) provide for the co-firing of biomass with an ineligible fuel. In the case of the Schiller Station FB unit, this may take the form of coal or some other ineligible fuel listed in its NH state permit. As per the RPS regulations at Section 14.05(3)(a), under co-firing, the "portion of electrical energy generation that qualifies" for RPS certificates over a given period of time is "equal to the ratio of the net heat content of the Eligible Biomass Fuel consumed to the net heat content of all fuel consumed in that time period." For any month in which PSNH co-fires an ineligible fuel with an Eligible Biomass Fuel, it would be required to report to the NEPOOL Generation Information System (GIS) Administrator and to DOER the different types and quantities of each, as well as to calculate in accordance with GIS protocols the electricity output attributable to each. DOER may require copies of such calculations.

To qualify under the RPS regulations, the unit's actual emissions under any co-firing scenario must remain within the "low emission" criteria for biomass generation units set forth by DOER in consultation with the Massachusetts DEP. Therefore, as discussed below in Section 6, GIS certificates would not be RPS-qualified during any month in which the unit's average emissions exceeded the limits of its Statement of Qualification, regardless of which fuels were used.

5. Discussion of Advanced Biomass Technology

The RPS regulations provide, at Section 14.05(1)(a)6, that the qualification of biomass generation units is limited to "low emission, advanced biomass power conversion technologies using an Eligible Biomass Fuel." These criteria are designed to insure that the RPS provides incentives for older, dirtier technologies to be replaced by cleaner and more efficient technologies. DOER also believes that biomass technologies should improve over time, both pursuant to the incentives created by the RPS and, more broadly, continued technological progress in the electricity generation sector.

Fluidized bed (FB) technology for steam generators was developed during the 1950's and 1960's and introduced during the 1970's. Its earliest perceived benefit was to reduce air emissions from the combustion of coal, followed by its flexibility and its ability to burn a wide range of other solid fuels. In addition to coal, FB can be used with fuels that have lower energy value and higher moisture content – industrial and municipal wastes as well as forestry and agriculture-derived biomass. The earliest fluidized bed boilers were bubbling fluidized bed (BFB), but circulating fluidized bed (CFB) boilers soon were developed as a second-generation adaptation. These two variants were first demonstrated in pilot projects, followed by scaling-up, commercialization, and application to various fuels. BFB units tend to be smaller and are the more likely choice for waste streams and biomass, while larger CFB units have been developed and are the more likely choice for utility boilers burning coal.

During the past two decades, further improvements have been made in materials and configuration. Among CFB boilers, for example, a major distinction developed between those that separated the solids from the gases using a large cyclone separator versus those that used

impact separators. CFBs from Babcock and Wilcox use the latter type, including two of its earliest units, installed in 1986 at the two Indeck, wood burning power plants in Maine. Babcock and Wilcox has subsequently modified its company's separator design and later introduced internal recirculation of the solids. Other recent innovations include a combination or hybrid of CFB and BFB, available from several companies, as well as a pressurized fluidized bed boiler.

Most fluidized bed boilers are produced by the following companies (in an industry characterized by much consolidation): Foster Wheeler (including the Finnish Ahlstrom Pyropower), Babcock and Wilcox, Energy Products of Idaho, LLB (including Lurgi/Lentjes and Deutsche Babcock), KvaernerGroup (including Tampella Power), and GEC Alsthom. The technology has been much less widely adopted in the U.S. than in Europe, with the number of fluidized bed boilers in the U.S. numbering in the scores compared to the hundreds in Europe.

Although already commercialized, fluidized bed technology is relatively young and still undergoing significant innovation and improvement with regard to technical efficiency, cost, and emissions. DOER has determined that the proposed Schiller project would utilize a more advanced fluidized bed technology than do the two 1986 Indeck boilers in Maine, already qualified for RPS under the Vintage waiver provisions at 14.05(2). Therefore, DOER's conclusion is that the proposed fluidized bed technology meets the "advanced technology" criterion of the RPS regulations.

6. Issues regarding Low Emissions

A generation unit using an eligible biomass fuel and advanced technology must meet the criterion of "low emissions" in order to be an eligible new renewable generation source for the RPS, per the regulations at 14.05(1)(a)6. This criterion does not set specific emission targets. Rather, the threshold for eligibility becomes more stringent as biomass conversion and emission control technologies improve. Under the RPS regulations at 14.05(1)(a)6.a, a generator must receive a valid air permit from its appropriate state air quality regulatory agency to qualify as an eligible biomass generator.[8] In addition, its emission rates must be consistent with comparable biomass units as prescribed by the DEP, per the RPS regulations at 14.05(1)(a)6.b.

This Advisory Ruling does not constitute a decision on the specific emission levels the facility must meet to be RPS eligible. Nor does this Advisory Ruling suggest that sufficient data has been presented to DOER and the DEP to form a basis for an eventual RPS Statement of Qualification at the projected emission levels. The Advisory Ruling serves as guidance to the project developers regarding the assessment of DEP and DOER of proposed emission levels, and the consistency of those levels with the RPS "low emission" requirement. DOER expects that the emission levels of the generation unit design included in PSNH's eventual RPS application will not vary substantially from what is currently proposed unless they are substantially more stringent as the result of choosing still more advanced technology.

[8] If the air quality regulations applicable in the jurisdiction where the unit is located do not require an air permit, then the unit must satisfy the requirements of the RPS regulations at 14.05(1)(a)6.c.

PSNH has submitted to DOER air emissions levels that have been specified and guaranteed by an unnamed FB vendor, and PSNH expects that the unit's emissions will be equal to or below BACT requirements for woody biomass and coal boilers of this size and general type. As stated above, however, it is the NH DES that ultimately would determine BACT requirements for this project, not the applicant, not DOER, and not MA DEP. The emission levels for the generation unit, as specified by the vendor, are presented in the table below. PSNH has stated that all emission limits presented in the table can be met under all permitted fuel inputs and combinations (i.e., 100% biomass, co-firing biomass with coal, or 100% coal), with the exception of the higher SO_2 emissions (as noted in the table) under 100% coal firing and, DOER presumes, intermediate SO_2 emission levels under co-firing.

AIR EMISSION LIMITS FOR PROPOSED AND EXISTING GENERATION UNITS

	Proposed Generation Unit			Existing Generation Units					
	PSNH Schiller Station Portsmouth, NH			**Indeck / Ridgewood Power [1] West Enfield, ME**			**Pine Tree / Tractabel [2] Westminster, MA**		
Generation Unit Data									
Type of Unit	Fluidized Bed			Circ. Fluidized Bed			Riley Stoker Boiler		
Date of Operation	n/a			Oct-87			May-92		
Emission Control Technology	BACT - design to be determined			multicyclone, ESP			multicyclone, fabric filter, SNCR		
Plant Net Capacity, MW	45			27			16		
Boiler Heat Rate, MMBtu/hr	608			362			260		
Biomass Input, tons/yr	500,000			170,968			180,000		
Emission Limits	**lbs/MMBtu**	**lbs/hr**	**tons/year**	**lbs/MMBtu**	**lbs/hr**	**tons/year**	**lbs/MMBtu**	**lbs/hr**	**tons/year**
SO_2	0.02	12.16	52.9	***0.03***	11	44.4	0.03	7.8	33.9
(under 100% coal)	0.12								
NO_x	0.08	48.64	211.6	0.3	108.45	249.9	0.175	45.5	197.9
PM	0.011	6.7	29.1	0.03	10.8	45.1	0.02	5.2	22.6
PM_{10}	0.011	6.7	29.1	0.03	10.8	45.1			
CO	0.1	60.8	264.5	***0.17***	62.2	249.9	0.22	57.2	248.8
VOC	0.008	4.9	21.2	***0.10***	36.2	145.8			
Lead							0.0007	0.18	0.79
Ammonia	10 ppm						10 ppm	2.04	8.9

Bold/Italics = calculated value as lbs/hr / Boiler Heat Rate

1. Data from Maine DEP Air Emission License A-91-70-A-I
2. Data from Massachusetts DEP Permit (Application No. C-B-89-031)

The table also includes air emissions permit data for two existing biomass generation units. The Indeck generating unit employs a circulating fluidized bed technology installed in 1986 and previously has been qualified as a generator for the Massachusetts RPS program under a Vintage Waiver provided in the RPS regulations at 14.05(2). The Pine Tree generation unit is the most recent biomass generation unit constructed in Massachusetts (1992) and, therefore, meets more recent emission levels; however, due to its stoker combustion technology and its having commenced commercial operation in 1992, it is not eligible under the RPS regulations.

The emissions data that PSNH has submitted for the Schiller biomass generation unit show lower emissions than the existing Indeck and Pine Tree generation units. DOER and DEP are

encouraged by these emission values, most notably the reductions in NO_x and PM/PM_{10}. DOER and DEP consider these proposed emission limits to be consistent with the "low emissions" criterion for RPS biomass generation units. However, this determination does not constitute a judgement of whether those limits do or should represent BACT, which the NH DES has the right and responsibility to determine for this unit.

Under a co-firing situation, the RPS regulations at 14.05(3)(b) state that the overall emissions of the generation unit must meet the "low emissions" criterion of such a unit fueled solely by the eligible biomass fuel (as well as the advanced technology criterion). DOER acknowledges the reasons for which the company wishes the Schiller generation unit to be permitted for the use of coal, as well as biomass. DOER and DEP recognize that the proposed increase in SO_2 emissions inherent under coal firing and possibly beyond a modest degree of co-firing could, at times, place the unit outside the biomass "low emission" criterion. However, given that coal would be used only as a "contingency" fuel, DOER believes it would be inconsistent with the public policy intentions of the RPS to disqualify outright the generation unit for RPS eligibility based solely on such a contingency.

Accordingly, Statement of Qualification for the generation unit would necessarily include the following provisions, with additional details, firm emission limits, and monitoring and reporting requirements to be provided at that time.

- Subject to receipt and review of an acceptable final application for a Statement of Qualification, the generation unit would be approved contingent on meeting prescribed emission limits that are consistent with or better than the values proposed in the above table, including the lower biomass SO_2 limit. DOER would evaluate and render a final decision on emission limits during its review of the application. DOER would consider in such review any new or revised emission standards that the DEP might meanwhile issue for any relevant pollutant, whether in regulation or in BACT determinations.
- DOER would establish a periodic reporting procedure for PSNH to inform DOER of fuel inputs and emissions of the generation unit, and to inform DOER of any exceedence of the RPS emission limits established for the generation unit.
- DOER would require PSNH to report quarterly the monthly fuel use and emissions from the generation unit. Upon any exceedence of the RPS emission limits, as specified in the Statement of Qualification, PSNH would be required to inform DOER in accordance with the provisions of 14.06(3). PSNH would have to inform DOER when the unit returned to compliance, and would have to provide satisfactory emissions monitoring data and a report on measures taken to return the unit to low emissions compliance. In the case of SO_2 and some other criteria pollutants, DOER expects emissions information to be readily available to PSNH by means of Continuous Emissions Monitors (CEMs). Further, DOER expects that the monitoring and reporting requirements of the unit's NH DES permit would prove adequate for meeting the RPS monitoring and reporting requirements, as well.
- The generation unit would receive RPS Certificates for all generation attributed to eligible biomass fuel, as long as the generation unit stayed within the prescribed low

emission limits, including the lower SO_2 limit specified for biomass combustion. Even under a co-firing mode, the generation unit would have to stay within those limits in order to receive the pro rata amount of RPS Certificates as provided in Section 14.05(3)(a). No RPS Certificates would be received for any electricity generated while the low emission criterion is exceeded. If the generation unit exceeded the prescribed emission limits averaged over any calendar month using any fuels, the generation unit's receipt of RPS Certificates would be suspended and would remain suspended for as long as the monthly average emission limits were in exceedence.

7. Summary of Ruling

DOER has found the proposed conversion of the Schiller Unit 5 to a fluidized bed biomass generation unit to fall within the eligibility criteria for new renewable generation biomass units as described in Section 14.05(1)(a)6. The following summarizes the key issues and requirements for PSNH to consider in its project planning, and by which DOER would be guided in reviewing the PSNH's application for the generation unit to qualify as a New Renewable Energy Generation Unit for the Massachusetts RPS.

1. DOER recognizes the proposed Schiller fluidized bed biomass generation unit as "advanced technology" in light of the continued improvements in the technology since its development in the 1970s. The Schiller plant, as proposed, demonstrates substantial technical advances compared to the previously qualified Indeck plants.
2. PSNH is reminded of the definition of Eligible Biomass Fuel and that RPS Certificates can be allocated only for generation that is derived from such eligible fuels. In the case of co-firing with an ineligible fuel, the quantity of RPS Certificates generated would be based on the relative BTU value of the eligible biomass fuel (provided the low emission limits are not exceeded as prescribed earlier and summarized below).
3. PSNH is reminded of the RPS requirement at 14.06(3) that it must notify DOER of any changes in the generation unit, its operations, and its fuel resources that would affect its eligibility as a New Renewable Generation Unit. PSNH is likewise reminded of the right of DOER, under 14.06(4), to suspend or revoke a unit's Statement of Qualification if it is judged to be out of compliance with the conditions of the Statement of Qualification, as well as to reinstate its qualification.
4. DOER could suspend the qualification of the generation unit if it utilized an ineligible fuel without co-firing with an eligible fuel for a significant period of time. Were that to occur, DOER could reinstate the unit's qualification upon finding that the unit had returned to eligible operation.
5. DOER considers the emission specifications PSNH has proposed for the generation unit to be within the current range of low emissions as required in the RPS regulations. PSNH has stated the intent to use eligible biomass fuel exclusively at all times except when the biomass supply becomes inadequate or uneconomic, when coal might be used as a contingency fuel.

PSNH recognizes that during the co-firing of coal with an Eligible Biomass Fuel, the SO_2 emissions may rise above the RPS prescribed low emissions limit for biomass.

6. PSNH is reminded that the RPS regulations state that, for a co-firing generation unit to be qualified for the RPS, the low emissions biomass standard must apply to the entire generating unit. DOER would not allow RPS Certificates to be created during any calendar month in which the average emissions of any CEM-monitored pollutants exceeded the emission limits specified in the Statement of Qualification, regardless of the fuels used. Accordingly, DOER would require quarterly reports of the unit's fuel inputs and emissions. Upon any exceedence of the RPS emission limits, as specified in the Statement of Qualification, PSNH would be required to inform DOER in accordance with the provisions of 14.06(3). If the generation unit exceeded the prescribed emission limits averaged over any calendar month using any fuels, the generation unit's receipt of RPS Certificates would be suspended and would remain suspended for as long as the monthly average emission limits were in exceedence. PSNH would have to inform DOER when the unit returned to compliance, and would have to provide satisfactory emissions monitoring data and a report on measures taken to return the unit to low emissions compliance. DOER expects that the monitoring and reporting requirements of the unit's NH DES permit would prove adequate for meeting the RPS monitoring and reporting requirements, as well.
7. PSNH should note that the emission rates that DOER currently finds acceptable as "low-emission" might not be regarded as such at a later date. In its review of PSNH's application for a Statement of Qualification, DOER would take into consideration any new or revised emission standards that the DEP might issue in the meantime for any relevant pollutant, whether in regulation or in BACT determinations. Therefore, PSNH is advised to expedite the development of its proposed project, to select the best combustion and control technologies that it can in consultation with both the NH DES and the MA DEP, and to monitor regulatory and BACT decisions of those two agencies during its project planning and design.
8. DOER reserves the right to specify more detail in an eventual Statement of Qualification and to make arrangements with the GIS Administrator for suspension of the RPS qualification of GIS certificates during any months of ineligibility.
9. Finally, PSNH and others should note that nothing in this Advisory Ruling should be construed in any way as an attempt to prejudge or influence the NH DES in making its determination of BACT requirements for this proposed project and the terms of the plant's permit(s). DOER recognizes that those decisions are under the authority of the NH DES.